Comments to the author:

I hope this email finds you well - thanks for your continued patience with the review process and your efforts in updating your manuscript. Two of the original reviewers have looked over your edits, and generally approve them. There are just a small number of corrections required, in particular the performance caveats which are highlighted in Report #2. However, if you implement these, I will be happy to look over the corrections rather than sending the paper out for full review.
I'm confident that these changes will be really quick for you to implement, and I look forward to seeing what I'm sure will be the final version of your manuscript.

Reply to the handling editor

Thanks for the editor for handling our manuscript. We revised the manuscript according to the comments of the two referees. Our responses to the referee comments are listed below.

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Reply to the referee #1

We thank the referee for careful review of our revised manuscript and thoughtful comments to improve it. In the following, we describe our responses (in blue) point-by-point to each referee's comment (in black).

Summary: the paper is much improved.

Major issues in initial review:

Data: Data has been released in acceptable form - I was able to validate I was able to read and plot the data.

Thanks for checking the datasets.

Data integration: The authors make a reasonable argument as to why now is not the time to integrate the datasets - however, I do urge the Dome Fuji group to work toward a merged product, now that this paper has validated this dataset.

As pointed out by the referee, we recognize that an essential task for the future is to combine

our data with published or forthcoming ice thickness data to produce integrated ice thickness data for the Dome Fuji region.

Beam patterns: While the authors are correct that fully quantifying the effect of the finite beam pattern on point data uncertainties would be a significant analysis, I recommend the authors add a statement to the caption for figure 4 that the histograms and derived values don't account for these geometric effects - in part to provoke such an analysis into existence!

We agree with the comment and add the description as “Note that the histograms and statistical values do not account for the geometrical effects of the finite beam pattern of radar antennae on survey data uncertainties.” in the caption for Figure 4.

Comparison with other ice thickness products (section 4.2): This is much clearer now.

Thanks for checking the revised descriptions.

Importance of the uncertainty analysis: Again, the authors are correct the analysis - to quantify (and justify) the appropriate level of uncertainty could be complex, multifaceted, and (at some level) demands a judgment call. That being said, there is some numbers for vertical resolution, interpolation settings, and line spacing where you can no longer resolve the peaks and valleys in this region, where the roughness analysis no longer provides useful information, and you can no longer match the surface dem to the bed rock DEM. I would not overthink the level of analysis requested. The danger (to scientists) is of course managers can use these numbers as criteria to stop data collection and technical improvement. It's a real tension - more is alway better, but where is the point of diminishing returns from a programatic perspective? Maybe a simple statement that more work is needed to quantify optimal uncertainties?

We added the following description at the end of “3.3 Uncertainties in ice thickness” (Line 212-215 in the revised manuscript). “Quantifying the uncertainty in gridded ice thickness data is complex because it involves multiple variables. However, assessing the uncertainty caused by factors such as the vertical resolution, line spacing of radar observations, and interpolation settings of gridded data is essential for resolving the complex subglacial topography in the study area. We suggest that it is necessary to accumulate observation data in the future to assess the optimal uncertainty quantitatively.”

Analysis beyond ice thickness: I think the authors have greatly improved the paper in this

respect.

We thank the previous referee comment recommending further analysis of the subglacial environment using the new ice thickness data.

Minor:
There are some long run-on paragraphs I suggest breaking up:
Section 2.2 of tc-2021-266-ATC2.pdf: I suggest paragraph breaks on line 130, line 133, line 139, and line 145.
Section 2.3 of tc-2021-266-ATC2.pdf: I suggest paragraph breaks on line 164, line 168, line 175.

We agree with all referee's suggestions and revised the manuscript.

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Reply to the referee #3

We thank the referee for careful review of our revised manuscript and thoughtful suggestions to improve it. We revised all statements as suggested except for comment on Line 21. In the following, we also describe our responses (in blue) point-by-point to some of referee's comments.

General comments:
I believe the authors' revisions have considerably strengthened this manuscript. The added sections about the subglacial conditions strengthens the discussion about the implications of this study. The new opening sentences at the beginning of the sections also provide improved readability of the manuscript. I have a list of minor technical comments that would provide further improvements throughout the manuscript.

Technical comments:
Note: Line numbers correspond to the track changes document

Line 21: "High-gain Yagi antennae were used to improve the antenna beam directivity and thus attain a significant decrease in features of unfocussed along-track diffraction hyperbolae in the echoes from mountainous ice-bedrock interfaces." → "High-gain Yagi antennae were used to improve the antenna beam directivity by significantly decreases hyperbolic features of unfocussed along-track diffraction hyperbolae in the echoes from mountainous ice-bedrock

interfaces."

We considered that "directivity by significantly..." was not what we intended, so we changed it to "directivity thereby significantly..." as we thought this was not our intention (Line 5-7 in the revised manuscript).

Line 29: "…between sets of the data" → "…between datasets".

Line 29: "Recognizing the improvement in data quality and comparing existing topographic products, we suggest that widely available bed topography products should be validated with in-situ observations where it is possible." → "Our analysis suggests that widely available bed topography products should be validated with in-situ observations where it is possible."

Line 88: "For identifying suitable sites for drilling very old ice, gaining knowledge of the subglacial topography and englacial layering is crucial." → "To identify suitable drilling sites for very old ice, it is crucial to gain knowledge of the subglacial topography and englacial layering."

Line 181: "The experimental variogram is fitted to a linear model whose parameters are determined by minimizing the average squared difference…" → "The experimental variogram is fitted to a linear model, and the model parameters are determined by minimizing the average squared difference…"

Line 185: "The uncertainties were assessed in terms of three error components, namely (1) the vertical..." → "The uncertainties were assessed in terms of three error components: (1) the vertical…"

Figure 3 caption: (a) change to "Gridded ice thickness (0.5km resolution)"? Maybe also add what the spacing of the contours are.

We changed the caption as "(a) Gridded ice thickness (0.5 km horizontal resolution) and the contours with intervals of 100 m."

Line 252: "The total uncertainty of ice thickness on the interpolated map consists of three factors. Two of them are associated with individual measurements, and another one is associated with interpolation." → "The total uncertainty of ice thickness on the interpolated

map consists of three factors: two of them are associated with individual measurements, and the third is associated with interpolation."

Figure 6 caption: Typo? "…shown in (a) were merged two data…" doesn't make sense to me

We changed the caption as "…shown in (a) were generated by data acquired on 17 and 21 December 2017."

Line 297: consider replacing the word "point"… maybe 2D" or just say ice thickness survey?

We changed "point ice thickness" to "ice thickness survey" (Line 229)

Line 307: Again, consider replacing "point".

We changed it to "ice thickness survey" (Line 235)

Line 355: consider replacing "aids" with "influences"

Line 386: → "…due to basal melting, which could eliminate the past climatic record"

Line 394: → "Driving stress correlates spatially with…" In this paragraph there are inconsistences in the use of "driving stresses" vs. "driving stress"

We changed to be consistent with "driving stress" in the paragraph.

Line 406: missing "the" → "from the bedrock surface"

Line 426-429 could use a reference to figure 8d about where we can see this evidence in the figure.

We added a reference to figure 8d as "…basal topography on which subglacial lakes exist (west and south of NDF in Fig. 8d),…" (Line 338), and "…present at two other basins (east of NDF and southwest of Dome Fuji) and…" (Line 339).

Line 459: → "and that the ice over troughs is subjected"